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| 09/462,214      | 01/04/2000  | JUNJI KODEMURA       | 10936-38            | 4799             |

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EXAMINER

JACKSON, MONIQUE R

ART UNIT

PAPER NUMBER

1773

DATE MAILED: 02/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/462,214

Applicant(s)

KODEMURA, JUNJI

Examiner

Monique R Jackson

Art Unit

1773

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 04 June 2001.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-6,8-12 and 14-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6,8-12 and 14-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 10.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

1. The amendment filed 6/4/01 has been entered. Claims 7 and 13 have been canceled. New claims 20-29 have been added. Claims 1-6, 8-12, and 14-29 are pending in the application.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Claim Rejections - 35 USC § 103***

3. Claims 1-3, 6, 8-12 and 14-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaneda et al (USPN 6,223,429, also WO96/42107) in view of Sugio et al (USPN 4,503,186.) Kaneda et al teach a semiconductor device and a method of producing the semiconductor device whereby an anisotropic conductive adhesive film cast from a solvent is used to adhere a semiconductor to a substrate and electrically connect opposing electrodes by heating and pressurizing the adhesive film therebetween (Col. 5, lines 1-29.) Kaneda et al teach that the anisotropic conductive adhesive comprises an insulating thermoplastic resin, thermosetting resin, or mixture of both, and conductive particles in an amount preferably of 0.1 to 30% by volume with respect to the matrix resin material in order to ensure anisotropic conductivity (Col. 6, lines 31-47.) Kaneda et al teach that the conductive particles may be a metal such as Ni, Ag, Au and Cu; may be formed of core polymer particles coated with any of these metals or a plurality of metals; or may be prepared by forming very thin organic insulating films on the metal particles or metal-coated particles in order to improve the insulating properties in the lateral direction of metal particles (Col. 6, lines 31-47.) The conductive particles preferably have an average particle diameter of from 0.5 to 20 $\mu$ m (Col. 6, lines 40-43.) Kaneda et al teach that the insulating matrix resin is selected such that it is capable of melting to turn

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fluid at the temperature of heat contact bonding, usually 120 to 250°C, hence higher than the T<sub>g</sub> of the resin, and cures in a short time, and may preferably be a resin having a modulus of elasticity of from 100 to 1,500 MPa at 40°C (Col. 5, lines 5-33.) Kaneda et al also teach that an adhesive material that is liquid at room temperature may also be used, but an anisotropic conductive film previously formed into a film is easier to handle, is unlikely to cause voids at the time of bonding, and has a superior reliability, whereby the adhesive film is formed by casting the adhesive composition dissolved in a solvent on a releasable sheet and drying the film to remove the solvent to form the film (Col. 5, lines 24-38; Examples.) Kaneda et al further teach an example whereby the anisotropic conductive adhesive film has a thickness of 25μm in the semiconductor package (Examples.)

4. Kaneda et al do not teach that the matrix resin is a cyclic structure-containing thermoplastic polymer as instantly claimed. However, as discussed in the prior office action, Sugio et al teach an adhesive composition comprising cyclic structure-containing polymers as instantly claimed, namely polyphenylene ether resins, which have excellent adhesiveness to metals such as copper, have excellent resistance to heat, solvent and moisture, and are suitable for electronics with high performance (Abstract; Col. 2, lines 30-40.) The polyphenylene ether resin may comprise polyphenylene ether obtained by poly-condensating at least one phenol to produce a polyphenylene ether with alcohol groups in a proportion of 5 to 100mol% based on the total number of monomer units in the polymer (Col. 4, lines 55.) The polyphenylene ether resin may also be a graft copolymer in which unsaturated monomer is grafted on the polyphenylene polymer or the copolymer (Col. 4, lines 35-55.) Desirably the polyphenylene ether resins have a number average molecular weight of about 1,000 to about 30,000, with examples of the

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polyphenylene ethers inherently having a glass transition temperature greater than 100°C (Col. 4, lines 35-57.) Polyphenylene ether resins having a relatively low molecular weight have good solubility and lend themselves to good handling, and on the other hand, polyphenylene ether resins having a relatively high molecular weight improve the mechanical properties of the resin composition (Col. 4, lines 57-63.) Thus, depending upon these properties, the polyphenylene ether resin is properly selected to suit a particular end use (Col. 4, lines 63-65.) The composition further comprises other polymeric resin materials including low-molecular weight resins, including epoxy resins, within a range of 1 to 50 parts by weight per 100 parts by weight of the polyphenylene ether (Col. 3, lines 23-55; Col. 5, lines 23-46; Col. 8, line 32 – Col. 9, lines 19.) Sugio et al teach that natural, reinforcing materials or fillers in fibrous or powdery form may be incorporated in the composition including non-conductive inorganic and conductive fillers wherein the filler material may be used in an amount of up to 400 parts by weight per 100 parts by weight of the resin solid (Col. 10, lines 37-57.) The curable resin composition may be applied to various uses and by various processing methods including applying the composition as a coating on a substrate or by forming a sheet of the material which can then be laminated, such as by placing the composition between two copper foils and applying pressure and heat at a temperature above the glass transition temperature of the cyclic polymer and then cooled (Col. 11, lines 8-44; Examples.) When the curable composition is in the form of a solution, the composition is dried to remove solvents from the adhesive (Examples.) Sugio et al further teach that the adhesive composition can be used to produce copper-clad materials such as for use in the electrical field or as circuit boards (Col. 1, lines 5-53.) Hence, given the teachings of Sugio et al, one having ordinary skill in the art at the time of the invention would have been motivated to

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utilize the thermoplastic polymer matrix material taught by Sugio et al in the anisotropic adhesive composition taught by Kaneda et al to provide improved mechanical and electrical properties particularly excellent adhesiveness to metals as taught by Sugio et al, wherein it would have been obvious to one having ordinary skill in the art at the time of the invention to utilize routine experimentation to determine the optimum adhesive layer thickness to provide the desired adhesive properties for a particular end use given that the thickness of the adhesive film is a result-effective variable affecting the adhesive strength between adhered surfaces.

5. Claims 1-5, 8-12 and 15-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaneda et al in view of Kataoka et al (USPN 5,783,639.) The teachings of Kaneda et al are discussed above. Kaneda et al do not teach that the insulating matrix resin is a cyclic structure-containing thermoplastic polymer as instantly claimed. However, Kataoka et al teach an insulating resin excellent in heat resistance, electrical insulating properties, adhesion, and chemical resistance, and useful in the field of electronics for example as an interlayer insulation material such as for semiconductor elements, or an layer insulation film for multilayer circuit boards with a layer thickness of up to 100 $\mu$ m (Col. 1, lines 7-25; Col. 12, lines 12-30.) Kataoka et al teach that the insulating resin composition comprises an epoxy group-containing cycloolefin resin formed by a graft modifying reaction, and a crosslinking agent such as the various polyamines and polyamides listed in Col. 7, which read upon the instant recitation of a "low-molecular weight resin", in an amount of 0.1-30 parts by weight per 100 parts by weight of the epoxy group-containing cycloolefin resin (Abstract; Col. 1, lines 23-25; Col. 3, lines 8-60; Col. 7, lines 22-62.) Kataoka et al teach that examples of the cycloolefin resin include polymers of norbornene type monomers such as a hydrogenation product of a ring-opening copolymer of a

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norbornene type monomer as well as others listed in Columns 5-6 that read upon the instantly claimed cyclic structure-containing polymer and have a glass transition temperature as claimed (Col. 3-Col. 6.) Kataoka et al teach that the number average molecular weight is generally 5,000 to 200,000 and the content of the epoxy groups in the resin is generally 0.05-5wt% on the basis of the weight of oxygen in the epoxy groups which would compute to a mol% within the instantly claimed range (Col. 3, line 60-Col. 4, line 2; Examples.) Kataoka et al further teach the excellent properties of these materials and their advantages in the electronics field (Col. 12, line 60-Col. 13, line 33.) Therefore, given the teachings of Kataoka et al, one having ordinary skill in the art at the time of the invention would have been motivated to utilize the insulating epoxy group-containing cyclolefin resin composition taught by Kataoka et al in the anisotropic adhesive composition taught by Kaneda et al to provide improved mechanical and electrical properties, such as excellent adhesion and excellent heat, solvent and chemical resistance as taught by Kataoka et al, wherein it would have been obvious to one having ordinary skill in the art at the time of the invention to utilize routine experimentation to determine the optimum layer thickness to provide the desired adhesive properties for a particular end use given that the thickness of the layer or film is a result-effective variable affecting the mechanical properties including adhesive strength between adhered surfaces.

### ***Response to Arguments***

6. Applicant's arguments filed 6/4/01 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Fujita et al (USPN 4,113,981) teaches an electrically conductive adhesive comprising conductive particles in a size and an amount to provide electric conductivity between facing electrodes but maintains electric insulation in the lateral direction. Budnaitis et al (USPN 5,879,786) teach an electrical package comprising an anisotropic adhesive positioned between electrodes wherein the adhesive resin may be polynorbornene, norbornene-terminated polyimide, cyclic olefinic polycyclobutene, functionalized polyphenylene ether, and blends or prepolymers thereof.

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monique R Jackson whose telephone number is 703-308-0428.

The examiner can normally be reached on Mondays-Thursdays, 8:00AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul J Thibodeau can be reached on 703-308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



mrj

January 24, 2003



Paul Thibodeau  
Supervisory Patent Examiner  
Technology Center 1700